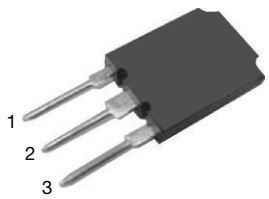
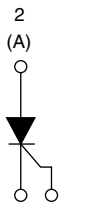
Thyristor High Voltage, Phase Control SCR, 70 A



Super TO-247



FEATURES

- High surge capability
- High voltage input rectification
- Designed and qualified according to JEDEC®-JESD 47
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb e3 RoHS COMPLIANT

APPLICATIONS

- AC switches
- High voltage input rectification (soft start)
- High current crow-bar
- Other phase-control circuits
- Designed to be used with Vishay input diodes, switches, and output rectifiers which are available in identical package outlines

DESCRIPTION

The VS-70TPS.. PbF high voltage series of silicon controlled rectifiers are specifically designed for high and medium power switching, and phase control applications.

PRIMARY CHARACTERISTICS	
$I_{T(AV)}$	70 A
V_{DRM}/V_{RRM}	1200 V, 1600 V
V_{TM}	1.25 V
I_{GT}	100 mA
T_J	-40 °C to +125 °C
Package	Super TO-247
Circuit configuration	Single SCR

MAJOR RATINGS AND CHARACTERISTICS			
PARAMETER	TEST CONDITIONS	VALUES	UNITS
$I_{T(AV)}$	Sinusoidal waveform	70	A
I_{RMS}	Lead current limitation	75	
V_{RRM}/V_{DRM}	Range	1200 to 1600	V
I_{TSM}		1100	A
V_T	100 A, T_J = 25 °C	1.4	V
dV/dt		500	V/µs
dI/dt		150	A/µs
T_J		-40 to +125	°C

VOLTAGE RATINGS			
PART NUMBER	V_{RRM}/V_{DRM}, MAXIMUM REPETITIVE PEAK AND OFF-STATE VOLTAGE V	V_{RSM}, MAXIMUM NON-REPETITIVE PEAK REVERSE VOLTAGE V	I_{RRM}/I_{DRM} AT 125 °C mA
VS-70TPS12PbF	1200	1300	15
VS-70TPS16PbF	1600	1700	

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ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum average on-state current	$I_{T(AV)}$	T_C = 82 °C, 180° conduction half sine wave		70	A
Maximum continuous RMS on-state current as AC switch	$I_{T(RMS)}$	Lead current limitation		75	
Maximum peak, one-cycle non-repetitive surge current	I_{TSM}	10 ms sine pulse, rated V_{RRM} applied	Initial $T_J = T_J$ maximum	930	
		10 ms sine pulse, no voltage reapplied		1100	
Maximum I^2t for fusing	I^2t	10 ms sine pulse, rated V_{RRM} applied		4325	A^2s
		10 ms sine pulse, no voltage reapplied		6115	
Maximum $I^2\sqrt{t}$ for fusing	$I^2\sqrt{t}$	t = 0.1 ms to 10 ms, no voltage reapplied		61 150	$A^2\sqrt{s}$
Low level value of threshold voltage	$V_{T(TO)1}$	T_J = 125 °C		0.916	V
High level value of threshold voltage	$V_{T(TO)2}$			1.21	
Low level value of on-state slope resistance	r_{t1}			4.138	mΩ
High level value of on-state slope resistance	r_{t2}			3.43	
Maximum peak on-state voltage	V_{TM}	100 A, T_J = 25 °C		1.4	V
Maximum rate of rise of turned-on current	dI/dt	T_J = 25 °C		150	A/µs
Maximum holding current	I_H	Anode supply = 6 V, resistive load, initial I_T = 1 A, T_J = 25 °C		200	mA
Maximum latching current	I_L	Anode supply = 6 V, resistive load, T_J = 25 °C		400	
Maximum reverse and direct leakage current	I_{RRM}/I_{DRM}	T_J = 25 °C	V_R = rated V_{RRM}/V_{DRM} ($T_J = T_J$ max., linear to 80 % V_{DRM} = R_g- k = open)	1.0	
		T_J = 125 °C		15	
Maximum rate of rise of off-state voltage	dV/dt	T_J = 125 °C		500	V/µs

TRIGGERING

PARAMETER	SYMBOL	TEST CONDITIONS		VALUES	UNITS
Maximum peak gate power	P_{GM}	T = 30 µs		10	W
Maximum average gate power	$P_{G(AV)}$			2.5	
Maximum peak gate current	I_{GM}			2.5	A
Maximum peak negative gate voltage	$-V_{GM}$			10	V
Maximum required DC gate voltage to trigger	V_{GT}	T_J = - 40 °C	Anode supply = 6 V resistive load	1.8	
		T_J = 25 °C		1.5	
		T_J = 125 °C		1.1	
Maximum required DC gate current to trigger	I_{GT}	T_J = - 40 °C	Anode supply = 6 V resistive load	150	mA
		T_J = 25 °C		100	
		T_J = 125 °C		80	
Maximum DC gate voltage not to trigger	V_{GD}	T_J = 125 °C, V_{DRM} = rated value		0.25	V
Maximum DC gate current not to trigger	I_{GD}			6	mA

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THERMAL AND MECHANICAL SPECIFICATIONS					
PARAMETER		SYMBOL	TEST CONDITIONS	VALUES	UNITS
Maximum junction temperature range		T_J		-40 to +125	°C
Maximum storage temperature range		T_{Stg}		-40 to +150	
Maximum thermal resistance, junction to case		R_{thJC}	DC operation	0.27	°C/W
Maximum thermal resistance, junction to ambient		R_{thJA}		40	
Typical thermal resistance, case to heatsink		R_{thCS}	Mounting surface, smooth and greased	0.2	
Approximate weight				6	g
				0.21	oz.
Mounting torque	minimum			6 (5)	kgf · cm (lbf · in)
	maximum			12 (10)	
Marking device			Case style Super TO-247	70TPS12	
				70TPS16	

$\Delta R_{thJ\text{-}hs}$ CONDUCTION PER JUNCTION											
DEVICE	SINE HALF WAVE CONDUCTION					RECTANGULAR WAVE CONDUCTION					UNITS
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
VS-70TPS..PbF	0.078	0.092	0.117	0.172	0.302	0.053	0.092	0.125	0.180	0.306	°C/W

Note

- The table above shows the increment of thermal resistance $R_{thJ\text{-}hs}$ when devices operate at different conduction angles than DC

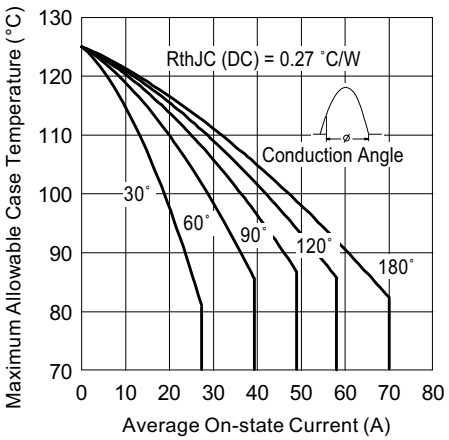

Fig. 1 - Current Rating Characteristics

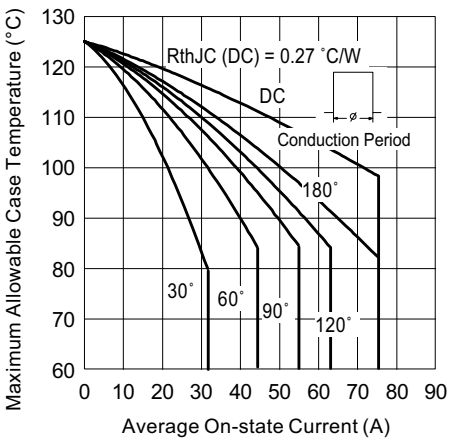

Fig. 2 - Current Rating Characteristics

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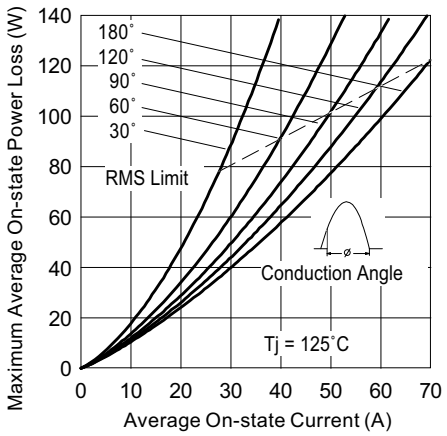

Fig. 3 - On-State Power Loss Characteristics

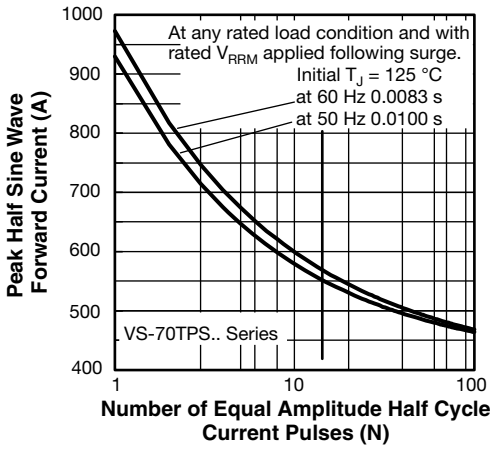

Fig. 5 - Maximum Non-Repetitive Surge Current

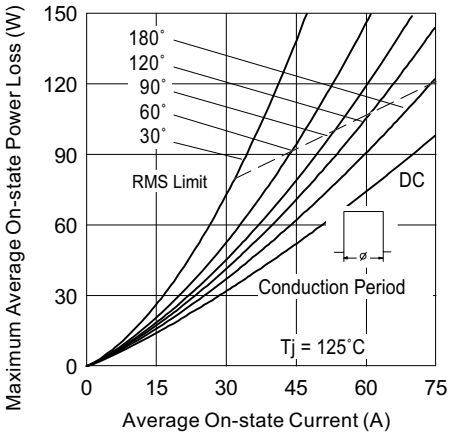

Fig. 4 - On-State Power Loss Characteristics

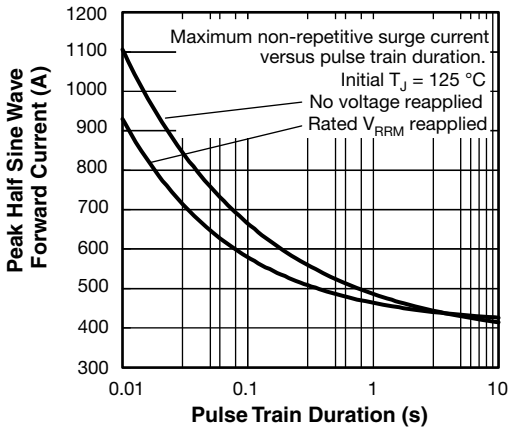

Fig. 6 - Maximum Non-Repetitive Surge Current

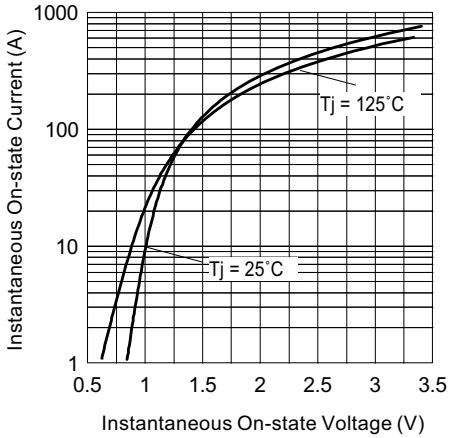

Fig. 7 - On-State Voltage Drop Characteristics

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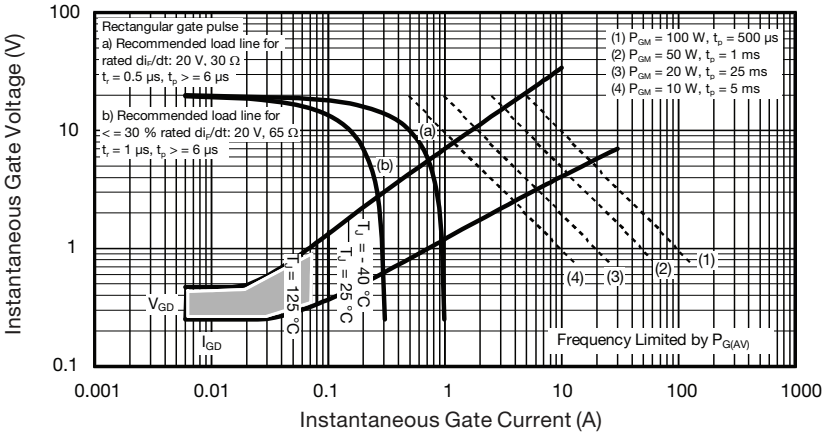

Fig. 8 - Gate Characteristics

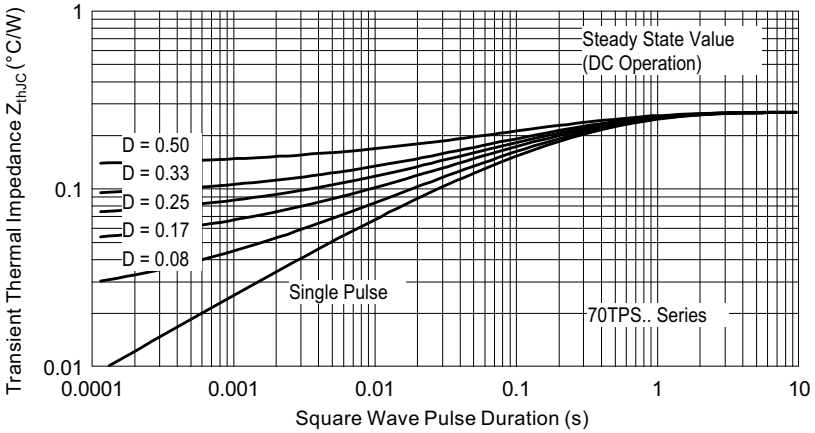

Fig. 9 - Thermal Impedance Z_{thJC} Characteristics

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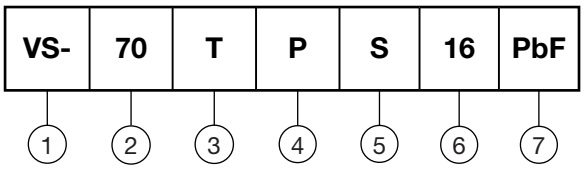
ORDERING INFORMATION TABLE

Device code



1 - Vishay Semiconductors product
2 - Current rating (70 = 70 A)
3 - Circuit configuration:
T = thyristor
4 - Package:
P = super TO-247
5 - Type of silicon:
S = standard recovery rectifier
6 - Voltage code x 100 = V_{RRM} — 12 = 1200 V, 16 = 1600 V
7 - PbF = lead (Pb)-free

ORDERING INFORMATION (example)			
PREFERRED P/N	**QUANTITY PER T/R**	**MINIMUM ORDER QUANTITY**	**PACKAGING DESCRIPTION**
VS-70TPS12PbF	25	500	Antistatic plastic tube
VS-70TPS16PbF	25	500	Antistatic plastic tube

LINKS TO RELATED DOCUMENTS	
Dimensions	www.vishay.com/doc?95073
Part marking information	www.vishay.com/doc?95070
SPICE model VS-70TPS12	www.vishay.com/doc?96760
SPICE model VS-70TPS16	www.vishay.com/doc?96761

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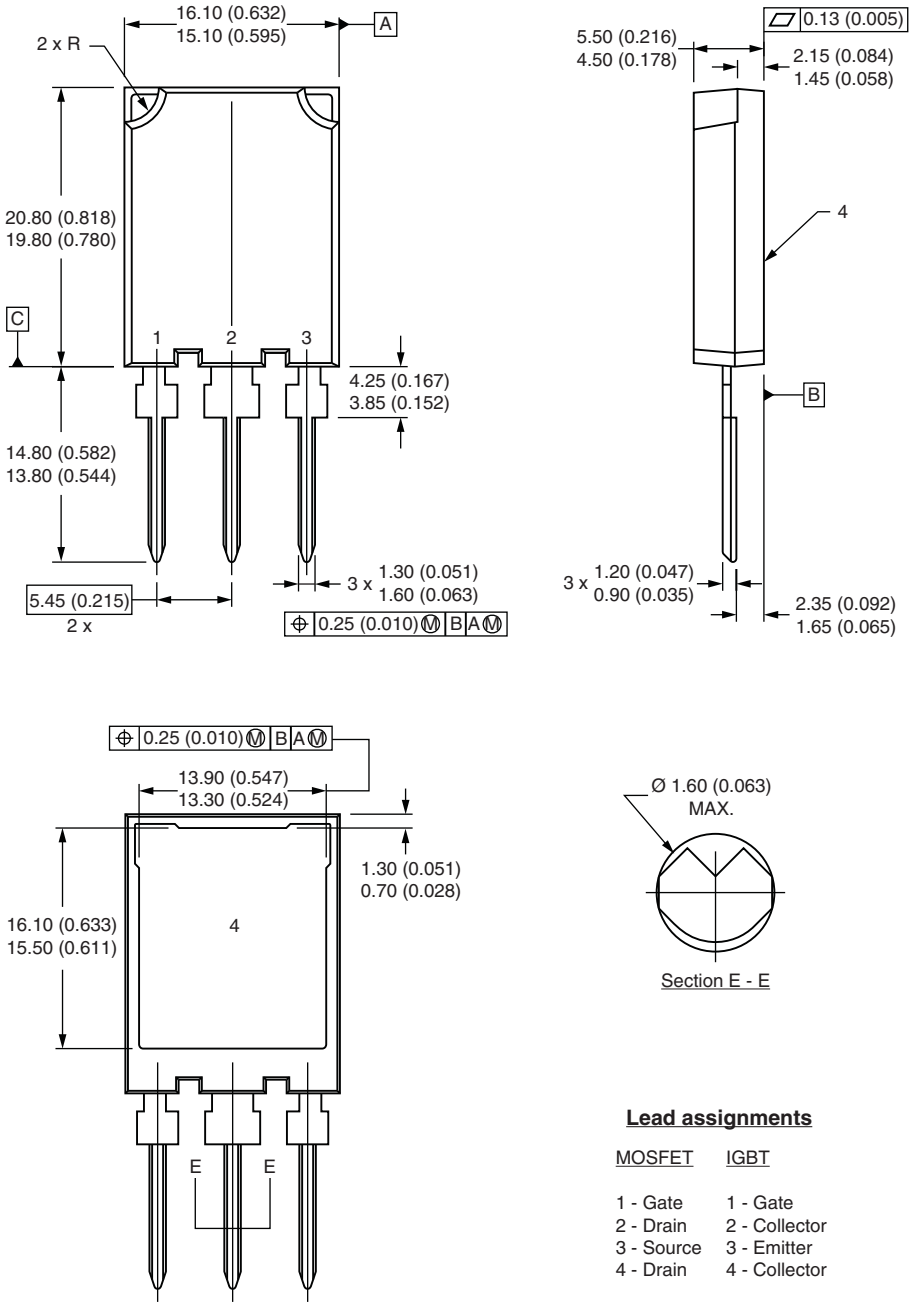
Super TO-247

DIMENSIONS in millimeters (inches)



Lead assignments

MOSFET	IGBT
1 - Gate	1 - Gate
2 - Drain	2 - Collector
3 - Source	3 - Emitter
4 - Drain	4 - Collector

Notes

(1) Dimension and tolerancing per ASME Y14.5M-1994
(2) Controlling dimension: millimeter
(3) Outline conforms to JEDEC® outline TO-274AA

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